National Institute of Environmental Health Sciences

# Impact of local adaptation measures and regional climate change on perceived temperature

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**Abstract:**

The perceived temperature (PT) is a measure for the quantification of human thermal comfort developed by the German Meteorological Service (DWD). In the present article, the sensitivity of PT on air temperature, water vapour pressure, wind speed, mean radiant temperature, street canyon width, and building heights is investigated. The mesoscale atmospheric model METRAS is integrated for a domain covering the city of Hamburg at 250 m horizontal resolution to calculate the meteorological input data for PT. The sensitivities of PT are determined by automatic differentiation of the basic DWD program. The sensitivities show how local adaptation measures and regional climate change can influence PT. The sensitivities also allow to estimate how accurate different input variables need to be known in order to achieve a desired accuracy in PT. The results are discussed in detail for 10 June 2007, a cloudless day with advection of warm air masses from south-east. A comparison with results obtained for different synoptic situations during summer is made. The sensitivities of PT on air temperature, water vapour pressure and mean radiant temperature are higher during warm and humid conditions than in situations with thermal comfort. The sensitivity of PT on wind speed is highest for low wind speeds. Around noon, increasing the building heights by 5 m can reduce PT up to 2.4 K due to shading effects in street canyons with aspect ratios above 0.5. After sunset, increasing the building heights by 5 m tends to moderately increase PT due to increased longwave radiation.

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## Resource Description

**Exposure :**

weather or climate related pathway by which climate change affects health

Temperature

**Temperature:** Fluctuations

**Geographic Feature:**

resource focuses on specific type of geography

Urban

**Geographic Location:**

resource focuses on specific location

Non-United States

**Non-United States:** Europe

**European Region/Country:** European Country

**Other European Country :** Germany

**Health Impact:** ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

**Mitigation/Adaptation:** ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

**Resource Type:** ☑

format or standard characteristic of resource

Research Article

**Timescale:** ☑

time period studied

Time Scale Unspecified